

METHOD AND APPARATUS FOR DESCRIBING AND SIMULATING COMPLEX SYSTEMS

ABSTRACT OF THE DISCLOSURE

A method for description and simulation based on organizing data into maps of invariants, the invariants being points of energy balance in a system of interest which is either in a stationary state or in a transitory disturbed state. The method includes
5 identifying invariants in the system of interest by identifying primary sources and sinks of energy, identifying secondary energy sources and sinks coupled to the primary sources and sinks, and coupling all such sources and sinks into a network of transformations organized around nodes of those sources and sinks corresponding to the invariants, each of the nodes being characterized by a locally defined principle of balanced self-
10 organization in a system with both a conservation law and energy dissipation. Such a system becomes "organized" upon achievement of a critical rate of entropy flux into the environment. Associated with each invariant are response rates related to energy transfer rates into and out of the invariants. The invariants are mathematically similar to the critical point found in equilibrium systems that undergo second order phase transitions.